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LIFE-HISTORIES OF INDIAN INSECTS MICROLEPIDOPTERA

VIII. TINEIDÆ AND NEPTICULIDÆ

BY

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Imperial Entomologist

AGRICULTURAL RESEARCH INSTITUTE, PUSA

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[Received for publication on 27th June 1919.]

TINEIDÆ.

MELASINA ENERGA, MEYR.

Melasina energa, Meyr., B. J., XVI, 616-617 (1905)(1) ; Fryer, T. E. S., 1913, 420-422, t. 21, ff. 1-4(2).

Described from Ceylon—Peradeniya(1, 2), Tangalla(1) and Yatiyantota(1). We have it from Peradeniya.

The larva has been described by Fryer as follows :—" The head is ovate in shape and is so attached to the first thoracic segment that the anterior surface is directed upwards, bringing the mouth forward ; in colour it is dark brown with the surface finely shagreened. The first thoracic segment is elongated and in front is slightly broader than the head but behind is markedly constricted ; its surface is chitinous, brown in colour and finely shagreened, this latter feature being less evident than in the case of the head. The remainder of the body is cylindrical, tapering slightly posteriorly ; in colour it is greenish-grey, lighter ventrally ; hairs are present but they are sparsely scattered and are very minute. The legs are brown in colour, rather long, and directed forward. The prolegs are very short and are armed with a series of broad hooks, the suckers being hardly functional. The spiracles are brown, those on the penultimate segment being large and conspicuous. Length 23 mm."(2). The larvæ live in earthy tubes, projecting above the surface of the ground like worm-tubes. These tubes, when the larva is full-grown, measure 100 to 150 mm. in length, two-thirds of the tube descending

vertically into the ground, whilst the remaining one-third lies horizontally on the surface or winds its way into a mass of dead leaves. The tube is cylindrical in shape and measures from 6 to 8 mm. in diameter throughout its median portion ; towards the free-end it is funnel-shaped, widening out until at its termination it may measure 12 mm. in diameter. The subterranean end of the tube, when the larva is young, appears to open freely into the earth ; in the case of full-grown larvæ it widens considerably, thus forming a pupal cell. In composition the tube is built of a strong, closely woven silk, to the outside of which grains of earth, pieces of dead leaf and broken twigs are attached, the earth covering the subterranean portion, while the dead leaves and twigs encrust that above ground. The pupal cell is formed by the terminal 20 mm. at the bottom of the tube and differs from the remainder in its greater width and in the increased thickness of its silken walls. Inside the pupal cell lies a thin cocoon which is cylindrical in shape and flat at each end ; it is peculiar in that it is composed of fine silk matted together by some dark-coloured secretion. This cocoon fits fairly closely into the pupal cell, but for the greater portion of its length is only loosely attached to it by a few strands of silk ; at the extreme lower end, however, it is firmly woven to the lower lips of the cell so that the flat end of the cocoon entirely blocks the subterranean entrance. This arrangement seems peculiar for, while the walls of the pupal cell are very thick, the end is guarded solely by the thin flat silken disc which forms the bottom of the cocoon. The similar disc, which forms the upper end of the cocoon, is easily detached and on the emergence of the moth is pushed up like the lid of a box. In the few cases examined the empty pupa skin was found in the cocoon.

The food of the larva consists of dead leaves and often decaying vegetable matter, feeding being accomplished only at night. (*Fryer.*)

MELASINA GRANULARIS, MEYR.

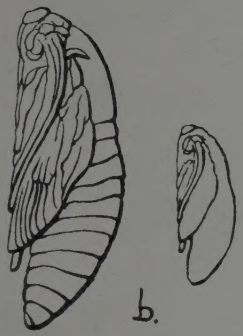
Melasina granularis, Meyr., Exot. Micr., I, 609 (1916)[1].

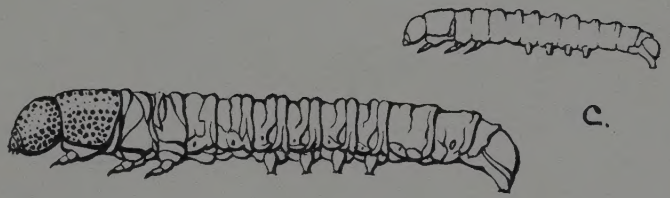
Bred at Peradeniya in March. "Larva in a long nearly cylindrical case of silk covered with refuse (length 12 mm., breadth 2 mm.), mostly whitish sometimes banded with grey, feeding on lichens beneath ledges of rocks and on trunks of trees (*Green*)"[1].

MELASINA CAMPESTRIS, MEYR.? (PLATE LIII.)

Melasina campestris, Meyr., Exot. Micr., I, 611 (1916)[1].

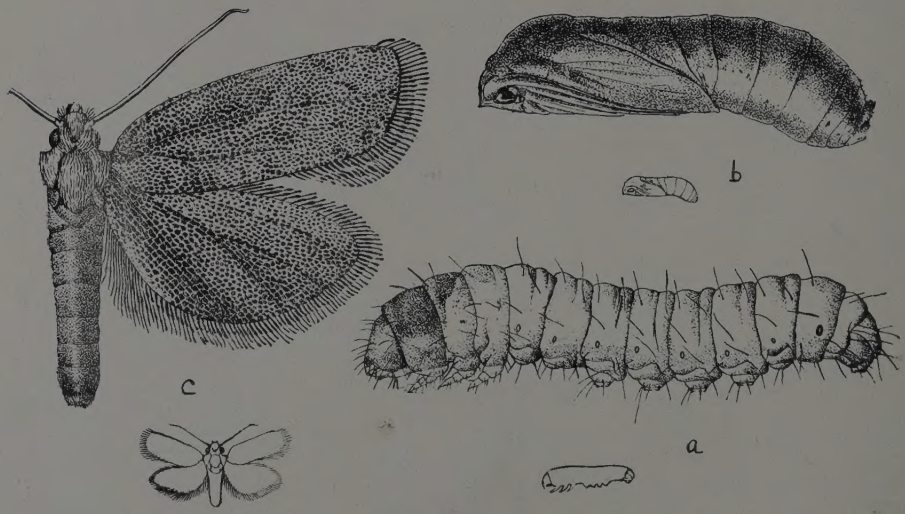
This species is abundant at Pusa about June and has been bred from larvæ found living in silken tubes lying on the surface of the soil but it is not





Melasina campestris (?) :—*a*, Larval tube (x 2) ; *b*, pupa, natural size and magnified (x 2) ; *c*, larva, natural size and magnified (x 2).

PLATE LIII.



Myrmecozela leontina:—*a*, Larva ; *b*, pupa ; *c*, moth, natural sizes and magnified (x 5).

certain whether the following description applies to *M. campestris* or to *M. devincta*, Meyr., or *M. ramifera*, Meyr., as all these three species are common at Pusa and the larvæ have not been distinguished. The larvæ form silken tubes which go down practically vertically into the soil to a depth of several inches. In confinement the larvæ have been observed to go right down to the bottom of a glass jar through about six inches of earth. The tubes are generally formed in dry and rather dusty places. The larva feeds apparently on dead leaves and grasses available on the ground, but in confinement occasionally eats fresh leaves and has been observed to gnaw a cork. The larva is about 25 mm. long, cylindrical, pale yellow, soft, with five pairs of prolegs ; head and upper surface of prothorax thickly chitinized and shiny, reddish-brown to black ; the surface of the head and prothoracic shield varies in different individuals from smooth to slightly corrugated transversely, but even when smooth there is a faint trace of corrugations. (It is not known whether this variation is individual or characteristic of specific differences, but no other differences were observable.) Pupation takes place in a stiff cocoon formed near the bottom of the tube below the surface of the soil. In the case of three pupæ found on 27th May 1915 the tube in each case had been carried about 40 mm. below the surface of the soil and at that depth had been closed entirely and a cocoon formed at this lower end ; this portion of the end of the tube is rather stiff, no doubt rendered so by the addition of a good deal of silk ; the remaining portion of the tube is soft like the tubes in which the larvæ are found and the upper end is prolonged slightly above ground-level, its mouth being open ; the head of the pupa is turned towards the mouth of the tube and the upper end of the cocoon is closed with a rather thick silken membrane which, however, is easily burst. On emergence of the moth, the pupa wriggles to the surface and the pupa-case is left protruded from the end of the tube or may lie entirely clear of the tube. Tachinid, Ichneumonid and Chalcidid parasites have been bred from these larvæ and pupæ. Eggs, obtained from bred moths, were laid in a cluster, gummed to one another on the wall of a glass cylinder. The egg is slightly elongate-oval or cylindrical with rounded ends, about 0·7 mm. long and 0·5 mm. broad, smooth, hardly shiny, creamy white. (Pusa Insectary Cage-slips 1229, 1387.)

MYRMECOZELA LEONTINA, MEYR. (PLATE LIV.)

Myrmecozela leontina, Meyr., B. J., XXI, 126([1]).

Originally described from Kulu([1]) and Pusa([1]), this species is abundant in the adult state at Pusa in June and July and we have it also from Chapra (Bihar).

It has been bred at Pusa from larvæ collected on 5th to 25th June 1916 in silken tubes amongst *dabhi* grass. On 30th June 1916 no more larvæ could be found although pupæ and empty pupa-cases were then found in the tubes. The larvæ are found in silken tubes which extend almost vertically downwards for several inches into the soil. At the mouth of the tube bits of dry grass and other rubbish are knitted together and these lie on the ground and completely hide the presence of the tube. The larva is very like that of *Melasina* but is apparently distinguishable by its smooth head—transversely corrugated in *Melasina*. The full-grown larva is about 18 to 20 mm. long, cylindrical, pale yellow; head smooth, red-brown; prothoracic shield large, lighter brown than head and divided by a narrow yellow medial line; hairs on segments long, not arising from tubercles; five pairs of equally developed, short prolegs.

Pupation takes place within the larval tube, no special cocoon being formed. The pupa is about 12 to 14 mm. long and about 2·5 to 3 broad, cylindrical, slightly bent ventrally; on the dorsal region of the anal segment there is a pair of pointed processes arising from a common transversely-flattened base and with their tips directed anteriorly. By wriggling movements and with the help of these processes, the pupa can move freely up and down the silken tube. Before emergence of the moth the pupa wriggles up to the mouth of the tube and partly issues out of it before the moth escapes. (Pusa Insectary Cage-slip 1404.)

MYRMECOZELA TINEOIDES, WLSM.

Setomorpha tineoides, Wlsm., P. Z. S., 1886, 465, t. 41, f. 8([1]); van Deventer, Tijds. voor Entom., XLVI, 81-82, t. 9, f. 3 (1904)([2]); Pagenstecher, Lep. Bismarck Archip., II, 232 (1900)([3]); Lefroy, Ind. Ins. Life, p. 540, t. 28, f. 10 (1909)([4]).

Amydria tineoides, Wlsm., P. Z. S., 1907, 1018-1019 (1908)([5]).

Originally described from Mhow([1]). "Not uncommon in India"([4]) and probably widely distributed.

Larva figured by Lefroy([4]) and van Deventer([2]); the latter is probably more accurate and shows the larva as 5 to 6 mm. long, whitish, head shining brown with lighter intersutural lines, plate of two large, narrowly divided medially, brownish, plates of 3 and 4 smaller, broadly divided, brownish; it lives in a case about 6 to 8 mm. long by some 2 mm. broad, broadest and slightly flattened in the middle, slightly expanded at either end.

Food:—Dried tobacco leaves ([4]).

Note. It is possible that Lefroy's figure, ascribed to this species, really represents the larva of *Setomorpha insectella*.]

Fig. 1. *Hypophrictis inceptrix*:—*a*, Larval case, with extruded pupa (x 2½). The outline figure shows the natural size ; *b*, larval case, with extruded pupa, seen from side (x 2½) ; *c*, larval case, with extruded pupa, seen from end (x 2½) ; *d*, moth, natural size (in outline) and magnified (x 7) ; *e*, head of moth, side-view, more highly magnified.

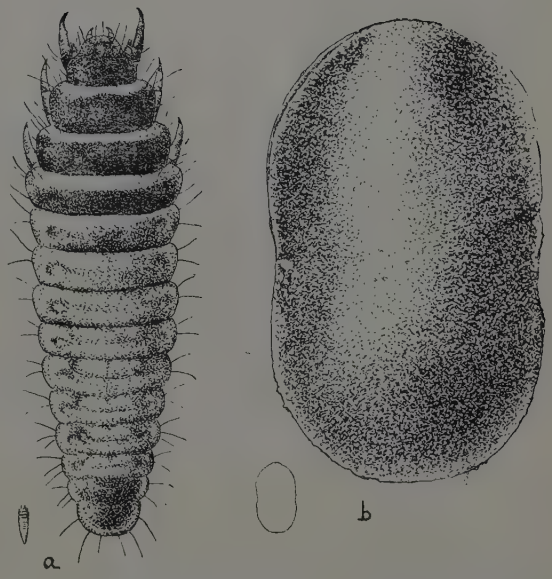


Fig. 2. *Hypophrictis sp.*:—*a*, Larva extracted from case, natural size and magnified (x 13) ; *b*, larval case, natural size (in outline), and magnified (x 7).

MYRMECOZELA ? CORTICINA, MEYR.

Amydria ? corticina, Meyr., M.S.

This species was reared at Pusa on 19th March 1914 from a larva found boring into bark of *banyan* (*Ficus bengalensis*) on 26th January. The larva was described as slender with a black head and prothoracic shield and five pairs of prolegs, but, as a specimen of *Latypica albofasciella* was also reared, it is uncertain to which larva this description applies. (Pusa Insectary Cage-slip 1035.)

MACHÆROPTERIS HALISTREPTA, MEYR.

Machæropteris halistrepta, Meyr., B. J., XXI, 128-129 (1911)(1).

Described from Puttalam in Ceylon, Gooty in Madras, and the Konkan(1). We have it from Coimbatore, Hospet (Bellary) and Pusa.

Larva in elongate, nearly flat, parallel-sided case (12×4 mm.), both ends rounded, composed of silk and grains of refuse, but entirely coated with silk outside(1).

It has been reared at Pusa from larvæ found in tubes.

HYPOPHRICTIS INCEPTRIX, MEYR. (PLATE LV, FIG. 1.)

Hypophrictis inceptrix, Meyr., Exot. Micr., I, 605 (June 1916)(1), *id.*, *l.c.*, II, 85 (1917)(2).

Described from Ceylon (Haputale) and Karwar in North Kanara(1). Moths were also taken at Pusa in September 1908 and October 1911.

"Larva found in nests of *Cremastogaster* (Formicidæ) at Ambalangoda, Ceylon, and imago bred in December at Pusa; in a singular nearly flat case composed (apparently) of two dark grey sections of stout silk joined together round the edges, shaped somewhat between an ellipse and an hour-glass, or like two coalescing circles, length 15 mm., greatest width 8 mm., contracted in middle to 6 mm.; pupa protruded from end in emergence"(2).

HYPOPHRICTIS (?) PLANA, MEYR. MS.

This species has been reared at Pusa from a larva found on a mango-trunk on 28th June 1906. The larva was described as about 12 mm. long, flat, tapering towards either extremity but more so posteriorly, segments well defined, pale yellowish-white; head flat, black, shiny, smaller than prothorax; prothorax and mesothorax wholly covered by a black shield; five pairs of minute prolegs. The larva lives in a flat 8-shaped case consisting of two thin 8-shaped parchment-like pieces attached to each other permanently by means of silk at the constrictions and coinciding along their margins. On the outside

these side-pieces are dry-earth colour and whitish inside. The larva extrudes itself from one of the ends up to about the metathorax, whilst it walks and feeds, the remainder of the body being protected by the case. When disturbed it withdraws its head inside the case. Pupation takes place within the case, the pupa wriggling out to some extent to one end of the case on emergence of the moth, which appears in November. There seems to be only one brood annually. (Pusa Insectary Cage-slip 380.)

HYPOPHRICTIS SP. (PLATE LV, FIG. 2.)

A Tineid larva, apparently belonging to a species of *Hypophrictis*, was found at Pusa in January 1916 underground in the nest of an ant, *Polyrhachis* sp. It was enclosed in a flat silken case as shown in figure *b*. Unfortunately the larva died and no more have been found, so that the moth has not yet been reared. It may possibly belong to *H. sollicita*, Meyr. (*Exot. Micr.*, II, 85) which was also described from Pusa.

SCARDIA SISTRATA, MEYR.

Scardia sistrata, Meyr., Exot. Micr., I, 618 (1916)([1]).

Described from Puttalam, Wellawaya and Peradeniya in Ceylon and from Pusa([1]). We have it from Pusa, Chakradharpur and Coimbatore.

Larva feeding in decayed fungus (*Polyporus*)([1]). At Coimbatore this species was reared from larvæ in fungus and at Pusa from larvæ in fungus (*Fomes* sp.).

Larvæ were found at Pusa on 22nd August 1908, boring into the thick tissue of *Fomes* sp. and producing tunnels filled with pellets of frass. Externally the presence of the larvæ in the fungus is indicated by dry pellets of frass webbed together into small masses. The larva was described as about 20 mm. long and 2·5 mm. broad, cylindrical, pale yellow, skin soft and transparent ; head and prothoracic shield brown, shiny ; five pairs of fully developed prolegs. Pupation takes place inside the tunnels in the fungus, the pupæ being found near the mouths of the tunnels which open externally, the opening being closed with silk and excrement. The pupa is about 12 to 13 mm. long, cylindrical, brown ; third and following abdominal segments with two transverse ridges across dorsum, the ridges surmounted by fine raised points ; anal segment with a pair of curved hooks on ventral side. On emergence of the moth, the pupa wriggles out of the tunnel to some extent and, when the moths have emerged, many empty pupa cases are found projecting out of the body of the fungus. (Pusa Insectary Cage-slip 741.)

EUCROTALA NUCLEATA, MEYR.

Eucrotala nucleata, Meyr., Exot. Micr., II, 96 (1917)([1]).

Bred in June from (bark or wood, probably, of) *Shorea robusta* from Gumna Range, Goalpara District, Assam (*Beeson*)([1]).

HAPSIFERA RUGOSELLA, STT.

Cerostoma rugosella, Stainton, T. E. S. (n. s.), V, 113-114 (1859)([1]); Wlsm., P. Z. S., 1885, 883([2]).

Dasyses rugosellus, Durrant, Ind. Mus. Notes, V, 104, t. 15, f. 3 (1903)([3]); Lefroy, Ind. Ins. Life, p. 540 (1909)([4]).

Dasyses rugosella, Meyr., Ann. Transv. Mus., III, 335 (1913)([5]).

Psoricoptera ? hirsutella, Wlsm., T. E. S., 1881, 261, t. 12, f. 29([6]).

Scalidomia hirsutella, Wlsm., T. E. S., 1897, 65([7]).

Dasyses rugosellus, Proc. Second Entl. Meeting, p. 257 (1917)([8]).

Originally described from Calcutta([1]), but widely distributed in and outside of India, being known from Natal([6]), Gambia([7]) and French Congo([7]); also recorded from Barrackpur([3])*, Poona([2]) and Peradeniya([3]). We have it from Pusa, Dharwar and Coimbatore.

Larva in galleries in fibrous stem of dead *Cycas circinalis*([3]), in dead wood([5]), in mango and *gular* bark and in frass of a Cerambycid borer in mango([4]). Larva found in dead papaya tree at Pusa. Also bred from papaya stem at Coimbatore.

The larva is about 25 mm. long, cylindrical, slightly tapering posteriorly, very soft, dirty pale yellow, skin almost transparent showing dark contents of alimentary canal; head and prothoracic shield shiny dark-brown; scattered grey hairs on segments; five pairs of prolegs. Pupation in a white cocoon found in the wood-dust or in any small corner of the bark. The pupa wriggles out of the cocoon to some extent on emergence of the moth. The larva lives in (probably dead) bark of mango, *Ficus glomerata* and papaya.

HAPSIFERA SECLUSELLA, WLK.

Cimitra seclusella, Wlk., Cat., XXIX, 780([1]).

Hapsifera seclusella, Moore, Lep. Ceylon, III, 499, t. 208, ff. 12, 13 (1887)([2]); Warren, P. Z. S., 1888, 338([3]).

Amydria seclusella, Meyr., Entom. Mitteil. Suppl., III, p. 61 (1914)([4]).

* *Note.* Durrant's record from "Bekpur" is obviously based on a misreading of a contraction for Barrackpur. The same error occurs in Swinhoe's *Catal. Het. Oxf. Mus.* in connection with other species.

Originally described from Ceylon(1), this species is widely distributed in India, where it has been recorded from Campbellpur(3), and has also been found in Formosa(4). We have it from Peradeniya, Chapra and Pusa.

At Pusa it has been reared from farmyard manure (cowdung) collected on 25th June 1916. The larva was boring the lumps of cowdung and living inside a silken tube around which pieces of cowdung and pellets of frass were fastened. Pupation took place in elongate-oval silken cocoons with stout walls and the pupa wriggled out to some extent through one end of the cocoon just before emergence of the moths, which took place from 13th to 23rd July. (Pusa Insectary Cage-slip 1416.)

SETOMORPHA INSECTELLA, FB.

Tinea insectella, Fabr., Ent. Syst., III, ii, 303 (1794)(1).

Setomorpha rutella, Zeller, Micr. Caffr., pp. 94-95 (1852)(2); Wlsm., T. E. S., 1891, 81-82, t. 7, f. 73(3); Cotes, Ind. Mus. Notes, II, 9-10 (1891)(4). *t. c.*, p. 164 (1893)(5); de Nicev., *l. c.*, V, 201-202 (1903)(6); Wlsm., Fauna Hawaii, I, 754 (1907)(7); Lefroy, Ind. Ins. Life, p. 540 (1909)(8); Meyr., Tr. Linn. Soc. (2), XIV, 302 (1911)(9).

Setomorpha insectella, Wlsm., P. Z. S., 1907, 1016-1019 (1908)(10).

A cosmopolitan species described, under at least eight other names, from North and South America, Hawaii, West-Indies, West and South Africa, Seychelles, India, Ceylon, Celebes, Makassar, and Queensland. [For more complete synonymy and distribution, see(10).] We have it from Pusa, Rangpur, Coimbatore, Darjiling, Mercara, Pollibetta and Nagpur.

Larva on dead animal and vegetable matter—on muscular fibre attached to skull of a hippopotamus(10), destructive to bales of country-blankets in Calcutta(4, 5), destructive to insect collections(1, 10), on various dried vegetable substances(9).

This species has been bred at Pusa on several occasions from larvæ found feeding on dry tobacco leaves, also from larvæ on stored coriander seeds, on *Setaria italica* grain in store, on wheat flour, and on *Dolichos biflorus* (seeds ?), and at Nagpur it has been reared on bean (in store ?).

The egg is about 0·25 mm. long by 0·17 mm. broad, pearly white, changing to very light-brown before hatching. The eggs are laid singly. Before depositing an egg the female extrudes her ovipositor for about 2 mm. and moves it from side to side, then raises it upwards between the wings and then with a jerk deposits an egg at the utmost reach of the ovipositor, and then moves to another place to lay another egg. The eggs hatch in about eight days, the young larva being about 1·25 mm. long, with a light-brown head.

The full-grown larva is about 17 mm. long, cylindrical, dirty-white, skin transparent, head red-brown, prothoracic shield greyish-brown; spiracles black; segments with minute scattered brown hairs; five pairs of prolegs.

Pupation takes place amongst the larval food (*e.g.*, dried tobacco leaves) in a tough white cylindrical cocoon. Pupa about 5 mm. long, cylindrical, tapering posteriorly, anteriorly light brown, posteriorly whitish. Pupal period about nine days in August. (P. G. Patel's Cage-slip 23.)

LATYPICA ALBOFASCIELLA, STT.

Cerostoma albofasciella, Stainton, T. E. S. (n. s.), V, 114 (1859)([1]).
Latypica albofasciella, Meyr., Exot. Micr., I, 606 (1916)([2]).

Originally described from Calcutta([1]) and since recorded from Pusa([2]) and Dibidi (Coorg)([2]), we have this species from Chapra and the Shevaroy Hills, and from Pusa in April, June, September and November (mostly in June). A specimen was reared on 14th April 1914 from a larva found boring into bark of *banyan* (*Ficus bengalensis*) on 26th January 1914 and described as slender with a black head and prothoracic shield and five pairs of prolegs; but, as a specimen of *Myrmecozela corticina* was also reared under these *data*, it is uncertain to which larva this description really applies. (Pusa Insectary Cage-slip 1035.)

ATABYRIA BUCEPHALA, SNELL.

Atabyria bucephala, Snellen, Tijds. voor Entom., XXVII, 166, t. 9, ff. 1, 1[a], 1[b] (1884)([1]); Meyr., Ann. Transv. Mus., III, 82([2]).

Originally described from Eastern Siberia([1]), this species is widely distributed and has been recorded from Borneo([2]) and Natal([2]). In India it is known from Chapra, Pusa, the Shevaroy and Khasi Hills.

The larva has not been described but the moth was bred from cocoons about a fungus growth on a tree at Yercaud, Shevaroys, in May 1913.

ELEGISTIS CUNICULARIS, MEYR.

Elegistis cunicularis, Meyr., B. J., XXI, 125-126.

Described from Maskeliya and Peradeniya, in Ceylon, the larva tunnelling dead wood, making long external tubes of silk and refuse([1]).

LEPIDOSCIA GLOBIGERA, MEYR.

Lepidoscia globigera, Meyr., B. J., XXI, 124-125([1]).

Described from Haputale in Ceylon, the larva in a sub-globose, egg-shaped case of silk covered with grains of refuse, feeding on lichens; length of case 8-10 mm., width 5-7 mm.([1]).

TINEA OPSIGONA, MEYR.

Tinea opsigona, Meyr., B. J., XXI, 123(1).

Occurs throughout India and Ceylon. We have it from Coimbatore, Pusa, Chapra, Rajshahi and Gurdaspur.

The larva does not seem to be known definitely, but in *Ent. Mo. Mag.*, 1898, p. 245, Lord Walsingham says that he knows "at least five Indian species [of *Tinea*] closely allied to *vastella*, one of which (*orientalis*, Stt.) is also a horn-feeding species." I do not know of any Indian *Tinea* described by Stainton as *orientalis*, which is probably a manuscript (unpublished) name equivalent with *opsigona*, Meyr., which has frequently been mis-identified with the African horn-feeding *vastella*, Z. Frequent inquiries from sportsmen in India have so far failed to reveal any knowledge of the presence of a horn-feeding *Tinea* in India.*

TINEA FRUGIVORA, MEYR. (PLATE LVI, FIG. 1.)

Tinea frugivora, Meyr., Exot. Micr., II, 77 (1917)(1).

Described from one specimen taken at Coimbatore in July and from a series bred in November and December from fruits of *Trichosanthes* (containing larvæ of a *Chætodacus* (Trypaneidæ)) collected at Lashio, 3,000 feet, Northern Shan States, in August, but probably the dried remains of the fruit were attacked later on the journey or at Pusa. The moths emerged between 14th October and 4th December 1914.

TINEA PELLIONELLA, LINN. (PLATE LVI, FIG. 2.)

Tinea pellionella, Linn., Syst. Nat. (ed. X), I, 536 (1758)(1); Meyrick, Handbook, p. 791 (1895)(2); Wlsm., P. Z. S., 1907, 1025 (1908)(3).

A cosmopolitan household pest, recorded from Europe, North America, North and South Africa, West-Central Asia, Ceylon, Japan, Australia and New Zealand. We have it from Rawalpindi, Madras, Pusa and Coimbatore and it is doubtless common throughout our limits.

Larva whitish; head brown; plate of 2 dark brown; in a case on cloth, feathers, hair, etc.(2).

A common household "clothes-moth," the larva feeding on furs, feathers, bird's nests, stuffed birds, woollens, clothes, carpets, etc. At Coimbatore

* *Note.* Since the above was sent to press, I have come across two cases at Sadiya, in North-East Assam, in which dead buffalo horns had been attacked by a horn-feeding larva, the empty pupa-cases remaining protruding from galleries eaten through the surface of the horn. As no moths were obtained, the species concerned cannot be identified. I should be glad to hear of any similar cases in India or to receive specimens of horns attacked by larvæ. [T. B. F.]

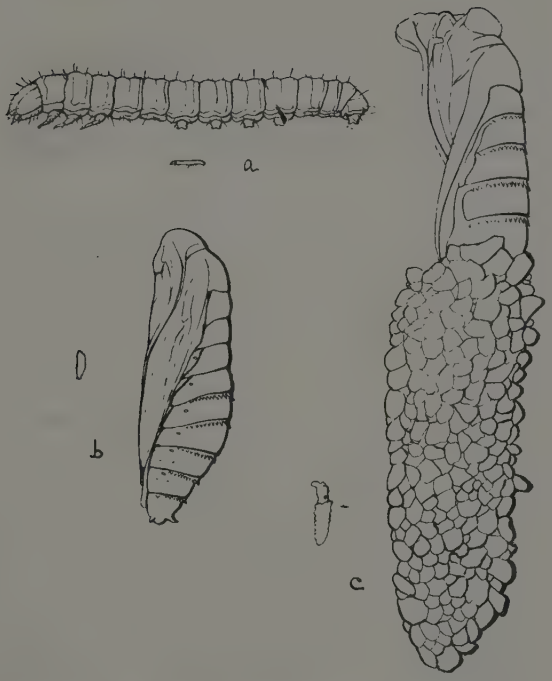


Fig. 1. *Tinea frugivora*:—*a*, Larva, natural size and magnified (x 11) ; *b*, pupa, natural size and magnified (x 11) ; *c*, pupa, extracted from cocoon; natural sizes and magnified.

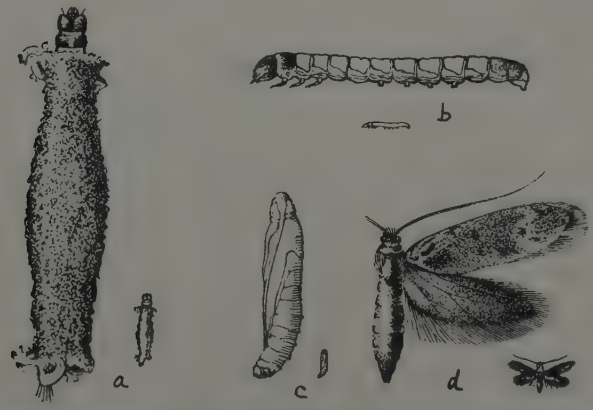


Fig. 2. *Tinea pellionella*:—*a*, Larva in case ; *b*, larva extracted from case ; *c*, pupa ; *d*, moth ; natural sizes and magnified (x 5).

Fig. 1. *Macraeola inquisitrix*:—*a*, Larva in case ; *b*, larva extracted from case ; *c*, pupa ; *d*, moth ; natural sizes and magnified (x 5).

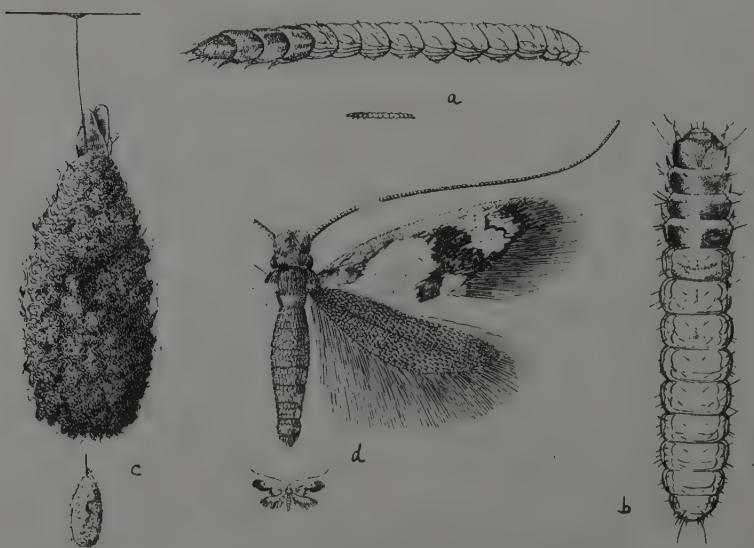


Fig. 2. *Crypsithyris longicornis*:—*a*, Larva, natural size, side view, and magnified (x 5) ; *b*, larva, dorsal view, magnified (x 8) ; *c*, cocoon suspended from thread, with extended pupa, natural size, and magnified (x 4) ; *d*, moth, natural size and magnified.

it has been bred from larvæ feeding on cloth lining of pith helmet, on woollen cloth, on Balaclava cap and on deer-skin, and at Pusa on clothes, on fur, on wool and on woollen cloth. It has also been sent in to us in February 1918 as infesting stored brushes in the Army Clothing Depôt, Madras, and in March 1918 as attacking Kashmir *numdahs* in the Army Divisional Supply Depôt at Rawalpindi.

The larva lives in a flattened silken case or bag covered with portions of the larval food. The larva is about 6 mm. long and 0·75 broad, cylindrical, dirty-white ; head and large prothoracic shield dark-brown, shiny ; five pairs of prolegs. Pupation takes place in the larval case, the pupa wriggling out through one end before emergence of the moth and remaining protruded from the empty case.

This is a destructive species to clothes, etc., of animal origin, breeding throughout the year. It is best kept at bay by frequent and regular sunning of clothes or by storing them with ample supplies of powdered naphthalene.

TINEA PACHYSPILA, MEYR.

Tinea pachyspila, Meyr., B. J., XVI, 619 (1905)(1), Rec. Ind. Mus., V, 231 (1910)(2), Tr. Linn. Soc. (2), XIV, 305 (1911)(3) ; Lefroy, Ind. Ins. Life, p. 540 (1909)(4) ; Fletcher, S. Ind. Ins., pp. 466-467, f. 342 (1914)(5).

Common throughout Ceylon(1, 3) ; also recorded from Trivandrum(2) and the Seychelles(3).

Larva living in a case on flannel, fur, etc.(3).

TINEA FUSCIPUNCTELLA, HAW.

Tinea fuscipunctella, Haworth, Lep. Brit p. 562(1) ; Meyr., Handbk., p. 791(2), Rec. Ind. Mus., V, 231 (1910)(3) ; Wlsm., E. M. M., 1907, 267(4).

A cosmopolitan household pest, known to occur practically all over the world. In India recorded from Kurseong(3) and the Simla Hills(3). We have it from Calcutta and Simla.

Larva in spun tube ; a refuse-feeder found on dried fruit, dried peas, etc. on all kinds of waste substances, on offal, in bird's nests, on meal-worm workings, etc.(4).

MACRÆOLA INQUISITRIX, MEYR. (PLATE LVII, FIG. 1.)

Macræola inquisitrix, Meyr., Exot. Micr., I, 602 (June 1916)(1).

Described from Pusa, where it was bred from a larva feeding on a dead wasp(1).

This species is abundant at Pusa in the larval stage, the larvæ being seen creeping over walls inside houses, dragging about their small cases

During the cold weather the larvæ are not much in evidence and seem to hibernate, but from about the end of February onwards they are sufficiently common. The larva seems to feed on dead organic matter of animal origin, such as dead insects or insect excreta. The larva is about 5 mm. long and about 0·8 mm. across prothorax, the mesothorax and metathorax rather narrower, the abdomen broadening to about 1 mm. towards anal extremity, convex dorsally, flattened ventrally, whitish-yellow; head dark chestnut-brown or black, shiny, with comparatively large antennæ; prothorax with a black shiny dorsal plate narrowly divided medially and also a similar ventral plate; mesothorax with a black shiny medially-divided dorsal plate and ventrally with a smaller ventral plate; metathorax with a less strongly chitinized medially divided dorsal plate; legs very developed, the second pair longer than the first, and the third pair longer than the second and about twice as long as the first; scattered whitish hairs on body; five pairs of minute prolegs. The larva lives inside a flattened grey silken case which may measure 10 mm. long by 2·5 mm. broad across the middle, tapering towards both extremities which are open and similar. The larva is not fixed inside the case but can project its head from either end at will. The exact length of life-cycle has not been noted.

TINEOLA BISSELLIELLA, HUMM.

Tineola bisselliella, Hummel, Essais Ent., III, 6-12, 13-14 (1823) ([1]); Wlsm., P. Z. S., 1907, 1026 [references]([2]).

This is an almost world-wide species, doubtless spread artificially, and known to occur in Europe, North Africa, North America, Australia and New Zealand. It has not been recorded from India before, but we have it from Peshawar and it is probably widely distributed within our limits.

The larva is described by Meyrick (*Handbook*, p. 782) as "whitish; head brown; on hair, wool, etc." Frohawk (*Entom.*, XX, 233) records a larva which lived for three years, feeding on bird's feathers.

TRICHOPHAGA ABRUPTELLA, WOLL.

Tinea abruptella, Wollaston, A. M. N. H. (3) I, 120 (1858)([1]).

Tinea bipartella, Rag., Bull. S. E. Fr., 1892, 93([2]).

Trichophaga abruptella, Wlsm., P. Z. S., 1907, 1020-1021 (1908)([3]); Fletcher, Entl. Note 92 (1916)([4]).

Trichophaga tapetzella, [nec Linn.], Fletcher, S. Ind. Ins., p. 467, f. 343 (1914)([5]).

Recorded from Madeira, the Canary Islands, Tunis, Egypt, Somaliland and Aden. Common throughout India. We have it from Pusa, Coimbatore and Bhutan.

This species has been reared at Pusa from larvæ found attacking the fur of a deer's hide. The larvæ live next to the skin, hidden amongst the hairs, which they eat. The attacked hairs do not fall off at once, as their cut bases are bound up in a greyish silken webbing which the larvæ exude and in which they live, their frass sticking to this webbing. At the slightest pull the hairs come off in large tufts along with the silken webbing, leaving the skin quite bare.

The full-grown larva is about 10 mm. long and about 1·25 mm. broad, cylindrical, yellowish dirty white, skin soft and transparent; head yellow brown; segments with thin white scattered hairs; five pairs of equally developed prolegs.

Pupation takes place inside the silken webbing in a white silken cocoon. The pupa is about 6 to 7 mm. long, yellow brown; anterior portion of dorsum of abdominal segments with a transverse row of small spines which increa in size on the successive segments towards anal extremity; anal segmen dorsally with hook-like spines with their tips bent anteriorly. The pupa wriggles out of the cocoon for about half its length before emergence of the moth; in some cases the empty pupa case is entirely pulled out by the emerging moth.

In spite of their concealed mode of life, the larvæ are liable to be parasitized by a Tachinid fly. (Pusa Insectary Cage-slip 824.)

CRYPSITHYRIS HYPNOTA, MEYR.

Crypsithyris hypnota, Meyr, B. J., XVII, 753-754 (1907)(1).

Described from Peradeniya, where the larva occurs in a case on lichens under rock-ledges(1).

CRYPSITHYRIS LONGICORNIS, STT. (PLATE LVII, FIG. 2.)

Tinea longicornis, Stainton, T. E. S. (n. s.), V, 113 (1859)(1).

Crypsithyris longicornis, Lefroy, Ind. Ins. Life, p. 539 (1909)(2).

Originally described from Calcutta(1). Also occurs at Pusa.

The "larva lives in the little oval case found commonly on plastered walls in Indian houses; the case is of fragments and apparently spiders' webbing woven up with silk and the larva moves slowly along the wall. Its nourishment is apparently the size in the whitewash or some similar organic material.

The pupa is in the case which is then hung from the ceiling by a thread, the pupa emerging at the upper end for the moth to escape "(2).*

Larvæ have been found at Pusa from November to March, walking on whitewashed walls. They rest motionless during the daytime and appear to move and feed only at night. The larva lives in a clumsy case which appears to be very large in comparison with its own size. It probably feeds on lichens.

CRYPSITHYRIS MESODYAS, MEYR.

Crypsithyris mesodyas, Meyr., B. J., XVII, 753 (1907)(1).

Described from Peradeniya where it was bred from a larva feeding on lichens on rocks and trees(1).

MONOPIS DICYCLA, MEYR.

Monopis dicycla, Meyr., B. J., XVI, 618 (1905)(1), Rec. Ind. Mus., V, 231 (1910)(2).

Recorded from Maskeliya in Ceylon(1), and from Calcutta(2).

Larva destroying woollen cloth(2).

MONOPIS HEMICITRA, MEYR.

Monopis hemicitra, Meyr., B. J., XVII, 417 (1906)(1).

Originally described from Puttalam (Ceylon)(1), this species was bred at Coimbatore in June 1916 from larvæ in a Mantid egg-mass.

MONOPIS MONACHELLA, HB.

Tinea monachella, Hubner, Tin., f. 143(1).

Tinea longella, Wlk., Cat., XXVIII, 479 (1863)(2).

Blabophanes longella, Moore, Lep. Ceylon, III, 503, t. 209, f. 1 (1887)(3).

Blabophanes monachella, Meyr., T. E. S., 1894, 27(4), Handbk., p. 785 (1895)(5).

Monopis monachella, Wlsm., Fauna Hawaii, I, 727-728(6); Meyr., Entom. Mitteil. Suppl., III, p. 59 (1914)(7).

A very widely distributed species, originally described from Europe(1), also recorded from Labrador, West and South Africa(6), Hawaii(6) and Formosa(7). Within our limits it occurs throughout India, Burma and Ceylon. We have it from Madulsima, Maskeliya, Nilgiris (4,300 feet), Palnis, Belgaum, Chapra, Pusa and Masuri.

Larva among rubbish—in bird's nests—in skins(6).

* *Note.* I am uncertain whether this account really applies to this species. It almost certainly includes *Macræola inquisitrix* (*q. v.*) whose larva lives on dead organic matter and is seen commonly in a little case as described. The case is of course suspended by the larva *prior* to pupation. [T. B. F.]

INCURVARIADÆ.

The only species of this family recorded as Indian is *Eriocottis fuscanella*, Z., an inhabitant of South Europe and Asia Minor, recorded from Karachi by Cotes and Swinhoe (*Cat. Moths India*, p. 704) and whose larval habits do not seem to be known. In the European genus *Incurvaria* " the larvæ either begin life as leaf-miners, afterwards living in flat cases formed of two pieces of leaf, or they are shoot-borers." (Stainton, *Nat. Hist. Tin.*, XIII, 56.)

ADELIDÆ.

Some twenty-five species of the genus *Nemotois* have been recorded as occurring within our limits, mostly in the Hills, the moths being easily recognisable by their immensely long antennæ and usually brilliant metallic markings, but the early stages of no Indian species appear to be known. In Europe the larvæ " feed on seeds in their earliest youth, and afterwards construct flat, bivalve cases and feed on the lower leaves of their foodplant or on other leaves." (Stainton, *Nat. Hist. Tin.*, XIII, 194.)

NEPTICULIDÆ.

The known larvæ of *Nepticula* mine galleries or blotches in leaves, and are without developed legs or prolegs, but with paired rudimentary ventral processes on segments 3, 4 and 6-11, or occasionally quite apodous. Pupa in a firm cocoon, usually outside the mine. A full account of the group is given by Tutt (*Brit. Lep.*, I, 162-360).

NEPTICULA ARGYRODOXA, MEYR.

Nepticula argyrodoxa, Meyr., Exot. Micr., II, 181-182 (1918)[1].

" Bred at Pusa in November from larvæ mining leaves of *Desmodium* sp. (Leguminosæ) "[1].

Larvæ were found at Pusa on 13th November 1916 mining under the epidermal layer on the upper surface of the leaves of *Desmodium* sp. The mine is narrow and zigzag and may spread all over the surface of the leaf. Inside the mine there is a thin streak of excrement. When the larva is full-fed it leaves the mine and forms a roundish, flattened, scale-like, brown, silken cocoon either on the surface of the same leaf or on its stalk or stem or on another leaf. The pupa emerges partially through one end of the cocoon before the moth emerges, and the empty pupa-case is left protruding from the cocoon. Moths were reared between 21st November and 3rd December 1916. Several parasites were also bred out. (Pusa Insectary Cage-slip 1496.)

NEPTICULA ISOCHALCA, MEYR.

Nepticula isochalca, Meyr., Exot. Micr., II, 6 (Oct. 1916)(1).

" Bred at Pusa in June from *Phyllanthus emblica* (Euphorbiaceæ) ; cocoon whitish "(1).

On 27th May 1910, several flattened, white, silken cocoons were collected at Pusa on the upper surfaces of leaflets of *Phyllanthus emblica*, only one cocoon being found on each leaflet. The contained pupa was flattened dorso-ventrally and the leg and antenna cases projected beyond the anal extremity. Before emergence of the moth, the pupa wriggled out of one end of the cocoon to some extent. The moths emerged between 3rd and 6th June. (Pusa Insectary Cage-slip 836.)

NEPTICULA LIOCHALCA, MEYR.

Nepticula liochalca, Meyr., Exot. Micr., II, 6 (October 1916)(1).

Bred at Pusa in July from larvæ mining in leaves of *Cyperus rotundus* (Cyperaceæ)(1). Mr. Meyrick further remarks that a sedge is a new and unexpected foodplant for this genus.

The original description includes the following note on the larva from particulars supplied from Pusa :—" Larva yellow, transparent, shiny, head brown, somewhat bilobed ; the mine is commenced either from the top or middle of the leaf, the larva mines down for some length and then takes a turn and mines up, the second portion being exactly parallel to the first, excreta deposited in a streak all along the mine ; the larvæ left the leaves and pupated in flat, oval cocoons of golden-yellow silk ; two examples were bred."

MICROPTERYGIDÆ.

Only a single Indian species (*Neopseustis calliglauca*, Meyr.), from the Khasi Hills, is recorded, and nothing is known regarding its larval habits.

A good recent account of the group is given by Tutt (*Brit. Lep.*, I, 129-162).